A 16-Week Aerobic Exercise Intervention Does Not Affect Hippocampal Volume and Cortical Thickness in Mild to Moderate Alzheimer's Disease

Introduction: Brain imaging studies in healthy elderly subjects suggest a positive effect of aerobic exercise on both brain structure and function, while the effects of aerobic exercise in Alzheimer's Disease (AD) has been scarcely investigated.

Methods: In a single-blinded randomized MRI study, we assessed the effects of an aerobic exercise intervention on brain volume as measured by magnetic resonance imaging (MRI) and its correlation to cognitive functioning in patients with AD. The study was a sub-study of a larger randomized controlled trial (ADEX study). Forty-one patients were assigned to a control or exercise group. The exercise group performed 60-min of aerobic exercise three times per week for 16 weeks. All participants underwent whole-brain MRI at 3 Tesla and cognitive assessment at baseline and after 16 weeks. Attendance and intensity were monitored providing a total exercise load. Changes in regional brain volumes and cortical thickness were analyzed using Freesurfer software.

Results: There was no effect of the type of intervention on MRI-derived brain volumes. In the entire group with and without training, Exercise load showed a positive correlation with changes in volume in the hippocampus, as well as frontal cortical thickness. Volume changes in frontal cortical thickness correlated with changes in measures of mental speed and attention and exercise load in the exercise group.

Conclusion: We did not find evidence to support an effect of 16 weeks of aerobic exercise on brain volume changes in patients with AD. Longer intervention periods may be needed to affect brain structure as measured with volumetric MRI.